PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Restoring Perennial Instream Flows At Ahtanum Creek

BPA project number: 20072
Contract renewal date (mm/yyyy): ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Dames and Moore

Business acronym (if appropriate) D&M

Proposal contact person or principal investigator:

Name	Mr. Cecil Urlich
Mailing Address	500 Market Place Tower, 2025 First Avenue
City, ST Zip	Seattle, WA 98121
Phone	206-728-0744
Fax	206-727-3350
Email address	seacmu@dames.com

NPPC Program Measure Number(s) which this project addresses
2.1 (Healthy Columbia River Basin); 7.1B (Conserve Genetic Diversity); 7.6BA-D (Hab Goal, Policies and Objectives); 7.7 (Cooperative Hab Protection & Improvement With Private Landowners); 7.8G (Instream Flows for Salmon & Steelhead)

FWS/NMFS Biological Opinion Number(s) which this project addresses

Other planning document references
FY 1999 Draft Annual Implementation Work Plan, May 13, 1998; Wy Kan Ush Me WA Kush Wit, Yakima River Subbasin Plan, Basinwide Recommendations; Columbia River Fish Management Plan; Columbia Basin System Planning Salmon and Steelhead Production Plan

Short description
Multi-year project to restore instream flows to Ahtanum Creek and thus to reestablish fish habitat. Proposed joint funding project between Ahtanum Irrigation District (AID) and BPA with research assistance from Yakama Indian Nation (YIN)

Target species
Primarily Spring Chinook, Steelhead, and Bull Trout; possibly Coho, Fall Chinook, and Cutthroat Trout

Section 2. Sorting and evaluation

Subbasin
Yakima

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
☒ Anadromous fish ☒ Resident fish ☐ Wildlife	☒ Multi-year (milestone-based evaluation) ☒ Watershed project evaluation	☐ Watershed councils/model watersheds ☒ Information dissemination ☐ Operation & maintenance ☒ New construction ☐ Research & monitoring ☒ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9603302	Evaluate the Feasibility and Potential Risks of Restoring Yakima R. Coho	Management support of re-introduced species to Athanum Creek
9506402	Upper Yakima Species Interactions Studies	Management support
9102	Ahtanum Creek Watershed Assessment	Use watershed data to facilitate restoration of salmon and steelhead
9603501	Satus Watershead Restoration Project	Restoration will supplement activites undertaken in Satus Watershed
9101	Restore Upper Toppenish Creek Watershed	Restoration will supplement activites in Toppenish Creek Watershed

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1993	Completed Comprehensive Water Conservation Plan	Plan identified more efficient water usage that would result in higher instream flows.
1999	Complete Constructibility and FeasibilityReview	Preliminary studies indicate that fish habitat can be restored and maintained.

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Obtain baseline environmental and engineering data necessary to weigh alternatives identified during scoping	A	Scoping. Identify issues that will determine alternatives for inclusion in the NEPA EIS
		1	Preliminary identification of issues and

			potential alternatives
		2	Scoping Meetings. Describe project and invite input from affected agencies, tribes, and the public.
		3	Prepare Preliminary Scoping Document
		4	Scoping Document review/comment
		5	Finalize Scoping Document based on agency comment
		B	Define Alternatives
		1	Determine Alternative "Themes" from Scoping
		2	Determine Engineering Feasibility
		3	Describe Alternatives to be Addressed in the EIS
		C	Collect Environmental Baseline information to describe the affected environment of alternatives in response to scoping.
		1	Fish and aquatic resources
		2	Vegetation, wetlands, & riparian areas
		3	Wildlife
		4	Threatened, endangered, & sensitive species
		5	Hydrology
		6	Geology and soils
		7	Land use
		8	Cultural resources
		9	Socioeconomics

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	01/2000	1/2001	Obtain baseline environmental and engineering data to evaluate alternatives identified during scoping		100.00%
				Total	100.00%

Schedule constraints
Agreements on the range of alternatives may take more time

Completion date
2005

Section 5. Budget

FY99 project budget (BPA obligated):

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%68	125,500
Fringe benefits	At 25%	%22	41,500
Supplies, materials, non-expendable property		%2	4,250
Operations & maintenance		%0	
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	
NEPA costs	Future step	%0	
Construction-related support		%0	
PIT tags	# of tags:	%0	
Travel		%4	7,850
Indirect costs		%3	5,800
Subcontractor	YIN, to be determined	%0	
Other		%0	
	TOTAL BPA FY2000 BUDGET REQUEST		$184,900

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
AID	Complete scoping, alternatives, & Study Documentation Report	%33	184,900
BPA	Provide partial funding for scoping, alternatives, & Study Documentation Report	%33	184,900
		%0	
		%0	
	Total project cost (including BPA portion)		$554,700

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	$200,000	$700,000	$1,000,000	$0

Section 6. References

Watershed?	Reference
☒	Monahan, John T., Instream Flow Recommendations for Ahtanum Creek, WA, April 1, 1994
☐	Bovee, Ken, US Fish & Wildlife Service, Direct Testimony of Development of Instream Flow Incremental Methodology and its Intended Purposes
☒	Author Unknown, Indian Fisheries in the Ahtanum Creek System: Anthropological and Ethnohistorical Evidence, No date
☒	Tuck, Robert L., History and Status of Anadromous Salmonids in Ahtanum Creek, WA, August, 1993
☒	Hatcher, Lynn, BPA Fish & Wildlife Program FY99 Proposal. Project No. 9102 Ahtanum Creek Watershed Assessment

☒	Foxworthy, B. Geology and Groundwater Resources of the Ahtanum Valley, Yakima County, WA, U.S. Geological Survey Water Supply Paper 1958, 1962
☒	PLSA Engineering & Surveying, Ahtanum Irrigation District Water Quality Study Supplemented by Summary and Interpretation of Water Quality, Stream Characteristics, and Aquatic Life in Ahtanum Creek Drainage, 1993.
☒	N.W. Power Planning Council, Yakima Subbasin: Draft, Species Specific Plan, October 1988.
☒	Cuffney, T.F., Meador, M.R., Porter, S.D., and Gurtz, M.E. Distribution of Fish, Benthic Invertebrate, and Algal Communities in Relation to Physical and Chemical Conditions, Yakima River Basin, Washington, 1997.
☐	Goodwin, Harry A., Memorandum to Area Engineer, Upper Columbia Development Office, Bureau of Reclamation, Spokane, August 16, 1960
☒	Simmons, C.D., Ahtanum Creek Instream Flow Study, August, 1993

PART II - NARRATIVE

Section 7. Abstract

The ultimate goal of this multi-year project is to restore instream flows suitable for native anadromous fish populations to Ahtanum Creek. Objectives are: 1) restore continuous instream flows to Ahtanum Creek; 2) improve instream habitat to permit successful reintroduction of anadromous fish; 3) stabilize creek banks and minimize deterioration of riparian areas; 4) and develop off-channel storage of water for maintaining the stream flow and providing for irrigation and flood control.

This project meets objectives set forth in the FY 1998 Draft Annual Implementation Work Plan for the Yakima Subbasin, which states that "the co-managers have adopted the following outcome-based objectives: 1) restore the Yakima Basin ecosystem integrity/function throughout all life history phases by implementing a "normative" or historical river ecosystem as an overall goal…"

The Ahtanum Irrigation District (AID) and D&M, through a State of Washington grant, will complete Phase 1, Constructibility Review, of the project in June 1999. The grant is administered by the Washington State Department of Ecology, in cooperation with the YIN and other public entities. Preliminary results indicate that stream flows can be restored and maintained in Ahtanum Creek. Phase 2 will be the Scoping/Environmental Research leading to a scoping report, a description of the alternatives, and a study documentation report that would describe the affected environment and support the NEPA EIS and required permits. This proposal addresses Phase 2 and requests shared funding. Phase 3 will be the analysis of impacts and mitigation, leading to an Impact Assessment Report that would further support the Draft/Final NEPA EIS and permits. Provided that the NEPA EIS supports the project, Phase 4 (Engineering) and Phase 5 (Construction) will be undertaken.

Section 8. Project description

a. Technical and/or scientific background

Researchers (Tuck, 1993; Monahan 1993; Goodwin 1960) have documented that Ahtanum Creek once abounded with aquatic life (steelhead, westslope cutthroat trout, bull trout, spring chinook, and probably fall chinook and coho salmon). However, since the late 1800s, the Creek has been heavily used for irrigation and parts have gone dry during the summer. Until the late 1980's, when a temporary rock backwater was constructed, the lower Wapato Irrigation Project (WIP) diversion at RM 9.8 constituted a total barrier to spawning adults (N.W. Power Planning Council 1988). A 1964 court ruled that the entire flow of the Ahtanum Creek be diverted into the WIP canal at RM 19.6 after July 10 of each year, rather

than being divided among users. Having seasons without flow in up to eight miles of the stream has severely damaged the aquatic habitat of the Creek and eliminated fish production in the reach without flows during the late summer irrigation season. Creek beds in the dry section are deteriorated, making flooding problems worse during spring runoff and further degrading habitat. Finally, more deep well irrigation occurs in the affected irrigation areas after July 10, causing groundwater levels to drop.

Although the levels of agricultural intensity are similar, Ahtanum Creek exhibits lower levels of biological impairment than other Yakima River tributaries flowing through irrigated agricultural land that were sampled in 1997 by U.S. Geological Survey (Cuffney et al. 1997). Satus Creek, the major steelhead spawning tributary of the Yakima River, had a significantly higher level of biological impairment. It is probable that at current levels of instream flow, biological community conditions in the seasonally dry section of Ahtanum Creek would rapidly degrade if pesticide contamination from agricultural activity were to increase, even modestly. In addition to restoring instream habitat, upstream access, and summer flows would greatly reduce the likelihood of increased biological impairment in the Ahtanum Creek system.

Research has indicated that if instream flows and proper fish passage were provided below the WIP diversion, Ahtanum Creek could produce significant numbers of steelhead, spring chinook, and possibly coho and fall chinook (Tuck, 1993). Improved instream habitat in the lower section of Ahtanum Creek would also provide a thermal refuge for juvenile chinook salmon in the lower Yakima River. The population of bull trout in the upper watershed would also be likely to expand into the restored stream area.

Water quantity, water quality, riparian conditions and substrates in the 10 to 20 miles of available spawning stream above the upper WIP diversion are good to excellent. The upper Ahtanum Creek system has a potential annual production of 72,350 spring chinook and 14,600 steelhead smolts. This represents 28 and 8 %, respectively, of the Yakima River Basin's steelhead and spring chinook potential production capacity, which is currently underutilized due to passage and instream flow problems (N.W. Power Planning Council 1988). The project may allow establishment of a fluvial population of bull trout, which would substantially enhance the pool of adult spawners in a chronically low population.

Ahtanum Creek drains a 171-square mile watershed, discharging into the Yakima River just south of the city of Yakima. The Ahtanum Creek watershed is about 25 % of the size of the neighboring Toppenish and Satus Creek watersheds. However, gauge records show that its annual runoff is over 50 % of the other two watersheds and its late summer base flow upstream from irrigation diversions may exceed those of either Toppenish Creek or Satus Creek. Higher watershed elevation and seasonal discharge of shallow ground water probably account for Ahtanum Creek's greater base flow, which in turn suggests significant potential for rearing salmon and steelhead (Hatcher, Ahtanum Creek Watershed Assessment Proposal to BPA).

A number of hydrology/instream flow needs modeling projects have been developed for Ahtanum Creek (Simmons, 1993; Monahan, 1994; and D&M, 1998). Based on a review of these, a multi-purpose reservoir was proposed with 20,000-acre feet (af) capacity. The reservoir would be filled during floods and at times when there is excess water, i.e., during winter and spring, in a manner that would be consistent with the multiple objectives of the project. At least 2500 af would be dedicated to instream flow augmentation for fish and wildlife, 5,000 af for AID irrigation, and 2,500 af for WIP irrigation. The additional 10,000 af would be carry-over storage for drought years. The reservoir could contain up to 24,500 af of water based upon topography. It would benefit fish and wildlife by providing dedicated water for fish and wildlife habitat when the stream is normally dry, and would provide alternative irrigation water for AID and WIP from July 10 until the end of irrigation season.

This proposal will also support YIN goals for reestablishing fish habitat within the Yakima Subbasin. It would advance the establishment of stream flows that would be critical to restoring anadromous fish production in Ahtanum Creek. Realization of the full potential for fish production will require additional projects in the watershed. The project will engender cooperation among all the different interests in the water of the Creek because it provides a means of restoring fish and solving other water problems without requiring that irrigation be discontinued in any of the existing agricultural areas.

b. Rationale and significance to Regional Programs

The NPPC and BPA have made substantial investments in Yakima Basin anadromous fish recovery. These investments are considered off-site mitigation for habitat losses elsewhere in the Columbia River Basin and are predicated on the fact that substantial wild salmon production potential still exists because large amounts of accessible, high quality spawning and rearing habitat still exists in parts of the basin. For example, FWP 7.6A Habitat Goal states: "protect and improve habitat conditions to ensure compatibility with the biological needs of salmon, steelhead and other fish and wildlife species. Pursue the following aggressively". Further, 7.6A.1 states: "ensure human activities affecting production of salmon and steelhead in each subbasin are coordinated on a comprehensive management basis". The YIN also has a long-term goal to restore fish populations to harvestable levels in the Yakima Basin.

c. Relationships to other projects

During Phases 2 and 3 of the project (scoping, alternatives, baseline inventory, and impact assessment), this project will rely heavily on research such as the YIN Ahtanum Creek Watershed Assessment; Satus Watershed Restoration (BPA #9603501); etc. This project supports most other BPA projects in the region that are related to the restoration of fish habitat in the Columbia Basin. It represents 28 percent of the Yakima River Basin's potential production of steelhead and 8 percent of the potential production of spring chinook salmon in areas currently underutilized due to passage and instream flow problems.

d. Project history (for ongoing projects)

Through a Washington State Department of Ecology Grant to the AID and matching funds by AID, a constructibility review of the Ahtanum Creek Inflow Restoration Project is currently underway by D&M. The review (Phase 1 of the project) is slated for completion in June 1999. Preliminary research suggests that the project is feasible.

e. Proposal objectives

The proposal objective is to complete Phase 2 of the project, the scoping, definition of alternatives, and inventory of the affected environment, for the Ahtanum Creek Inflow Restoration Project. Phase 2 will obtain all environmental and engineering data necessary to weigh alternatives identified during scoping.

f. Methods

Phase 2 of the project will follow BPA's NEPA guidelines. D&M will coordinate scoping and preliminary research with interested and affected federal, state, and local agencies, the YIN, and the public. Strict adherence to NEPA requirements, BPA requirements, and YIN requirements will be followed. Baseline studies will use currently accepted protocols. Methods for individual tasks are further described below.

Task A. 1. Many of the issues are already obvious from the interactions on the first phase of the project. In addition, the topography and other features limit the options for some components that can be considered as alternatives. This subtask will simply generate lists of potential issues and options for facilitating scoping meetings.

Task A. 2. Scoping meetings will be held with all cognizant agencies and tribes and then with the public. They will be coupled with advertisements and a newsletter to inform and invite the public.

Task A. 3, 4, and 5. The scoping document will be drafted, reviewed by appropriate agencies, and finalized. It will follow NEPA and BPA implementation guidelines.

Task B. 1, 2, and 3. Defining alternatives will begin by determining themes that respond to scoping comment and legal issues. Agency input will be sought for the themes. Once the themes are defined, conceptual engineering and feasibility considerations will help define specific alternatives. These would be

reviewed with the agencies. The end product of the process will be a written description of the alternatives, including appropriate figures and drawings.

Task C. 1. The fish and aquatic resource studies will:
1. *Describe stream flow and water temperature regime during the irrigation season in the mainstem of Ahtanum Creek below WIP canal at RM 19.6*: Creek flow and temperature will be recorded with sufficient spatial resolution to detect significant seepage gains and losses. Temperatures will be measured using instream temperature recorders to determine seasonal and daily temperature changes.

2. *Describe irrigation water use in the mainstem of Ahtanum Creek:* Sites of surface water withdrawals and return flows (irrigation water) will be surveyed and mapped using existing GIS coverages, orthophotos and irrigation district maps. Withdrawals and return flows will be measured with available gaging records and on-site data collection.

3. *Describe channel and riparian areas of the mainstem of Ahtanum Creek:* Channel morphology, riparian vegetation and trends in these features over time will be mapped using information from available reports and on-site surveys. Possible barriers to fish migration will be surveyed.

4. *Recommend minimum instream flows:* Preliminary instream flow data gathered during Phase I and Instream Flow Incremental Methodology will be used to model an accurate assessment of minimum instream flows necessary to restore runs of anadromous salmonids.

5. *Describe fish population response to proposed habitat changes:* Habitat utilization by steelhead and chinook salmon in similar drainages within the Yakima River basin will be researched to determine the predicted response of reintroduced anadromous salmonids to changes in instream flows that would result from the maintenance of minimum instream flows in the mainstem of Ahtanum Creek. The structure and composition of fish populations in the mainstem of Ahtanum creek will be assessed by standard sampling methods (electrofishing, snorkel, etc.).

6. *Describe alternative methods for restoring instream flows:* Possible options for augmenting instream flows directly or through water swaps will be considered. Methods of delivering reservoir water to potential delivery locations will be studied and alternatives suggested.

Task C. 2. Vegetation cover of the reservoir area and areas of stream and riparian zone directly affected by the project will be mapped from aerial photographs, ground verified, and entered into a GIS. Wetlands in the potentially affected areas will be delineated using the Corps of Engineers methods and mapped.

Task C. 3. Wildlife and habitats will be inventoried first from existing databases, such as Washington State Priority Species and Habitats. Surveys will be limited, focusing on habitats and using literature references to define expected wildlife usage. Based on scoping, some surveys for particular species of concern may be incorporated.

Task C. 4. Threatened, endangered, and sensitive species use of the area will incorporate information from state and federal databases and on-the-ground searches for expected species.

Task C. 5. The hydrologic analysis would include generation of flow sequences and recurrence and drought probabilities for the natural discharges of Athanum Creek and approximate modeling of the effects of the cyclic groundwater storage and discharge that is known to occur along the Creek.

Additional sequences of flow data would be modeled and generated for each scenario derived from a unique alternative theme. These would include different schemes of

diversion that resulted from various operational and water allocation priorities, variable modes of reservoir storage, and response to storage control events on the Yakima River. Synthetic data may be used to model the probability of drought sequences and its effect on each of the schemes.

Task C. 6. The geology and soils of the affected project area will be described primarily from existing mapped information and from the drilling done in the area.

Task C. 7. Land use will be described from a combination of county plans, existing maps, and aerial photograph interpretation.

Task C. 8. Cultural resources will be described from information gathered in Phase 1 along with further investigations and from the YIN specialists.

Task C. 9. The existing socioeconomic relationships that might be affected by the project will be described from published information, interviews, and observations.

g. Facilities and equipment

D&M will complete Phase 2, the studies that would support the first three chapters of a NEPA EIS. D&M has a staff of fish-, wildlife-, and vegetation-biologists, hydrologists, archaeologists, socioeconomists, geologists, land use specialists, and engineers who are experts in their respective fields. It is the intent of D&M to engage YIN experts to assist with cultural resource and fish and wildlife studies. D&M owns the computers, GIS systems, field notebook computers, streamflow-measuring equipment, and other facilities and equipment needed to complete the work.

h. Budget

The budget requested is half of that needed to complete Phase 2 of the project. The other half will be funded by AID. Phase 1 (Constructibility Review) was funded by the Washington State Department of Ecology and AID. Anticipated cooperation with the YIN and others may allow other funding sources to be included in future phases.

Section 9. Key personnel

Key personnel will include; David Every, PhD, EIS specialist and task leader (0.2 FTE); Robert Nielsen, Ph. D, fisheries (0.3 FTE); Stephen Luxton, P.E., water resources(0.1 FTE); Jeremy Pratt, water rights (0.1 FTE); Cecil Urlich, P.E., program manager (0.2 FTE). Brief resumes for them are included below.

A) **A. DAVID EVERY, PH.D.**

Title	Senior Ecologist
Expertise	Terrestrial Ecology and Botany Environmental Impact Assessment Wildlife Habitat and Wetlands Evaluation Mitigation Planning
Academic Background	Ph.D., Botany, University of Washington, 1977 M.S., Botany, University of Utah, 1969

B.S., Zoology, University of Utah, 1967

Experience

Dr. Every has over 20 years experience as an environmental consultant on ecological issues throughout the United States including Alaska. He has managed several large and complex environmental impact statements, baseline studies, and resource inventories. Projects include reclamation planning for vegetation, wetlands, wildlife and fish habitat. A few of Dr. Every's accomplishments include:

- Project Manager for the environmental impact statements (EISs), and resource inventories for the 45,000 to 130,000-acre Ushk Bay and Eight Fathom timber sales.
- Biology Task Leader for the Pine Hollow Reservoir Constructibility Review, Ahtanum Creek.
- Task Leader for the biological resources and field inventory for the Cache la Poudre water and power supply project.
- Task Leader for inventory and assessment of the Seattle City Light dams' original impacts on the fish and wildlife habitat of the upper Skagit River.
- Task Leader for biological investigations for a proposed petroleum pipeline extending across the Cascade Mountains. In charge of permits associated with wetlands and stream crossings, and threatened, endangered, and sensitive species.
- Team Manager for developing a long-term management plan for the City of Seattle's 90,000-acre Cedar River Municipal Watershed. The inventories included timber, wildlife and fish habitat, hydrology, roads, and cultural resources.
- Principal biologist for the Environmental Assessment (EA) for the Boundary-Spokane/Colville Valley transmission project for the Bonneville Power Administration.

B) **CECIL M. URLICH, P.E.**

Title Prinicipal Engineer

Expertise

Dam and Flood Control Planning and Design
Geotechnical and Civil Engineering
Waste Impoundment Planning and Design

Academic Background

B.Sc. (1968), (Senior Scholarship), Mathematics, University of Auckland, New Zealand

B.E. (1970), (First Class Honors), Engineering Science, University of Auckland
M.Sc. (1972), Geotechnical Engineering, University of Calgary, Alberta, Canada
Correspondence Course "The Natural Environment," West Coast University (1973 to 1975)

Registration

Professional Engineer, Washington, No. 31611, 1994, Oregon; No. 17530, 1994; California.

Experience

Mr. Urlich has over 25 years experience in civil engineering with specialization in geotechnical engineering and dam planning and design work. His experience includes:

- Principal-in-charge for design review and earth materials evaluation for raising the 120-foot tailings and water retention dam at Kettle River Mine in Republic, Washington.

- Project manager for the 100-feet-high earthfill Retention Facility 3D Dam for storing coal process slurry at Centralia Mine, Washington.
- Project manager for the **Ahtanum Creek/ Pine Hollow Reservoir** pre-feasibility and constructibility study
- Principal engineer for stability and liquifaction analysis of the 23 and 50-feet-high earthfill Lake Chaplain North and South Dams at Everett, Washington.
- Principal engineer for the design of a reinforced concrete Clear Creek Dam and intake structure, and removal of a failed concrete gravity dam at Forest Grove, Oregon.

Professional Affiliations American Society of Civil Engineers
Association of State Dam Safety Officials

C) **ROBERT NIELSEN**

Title Fisheries Biologist

Expertise Fisheries Ecology and Management
Biological Assessment and Wildlife Management
Population Genetics
Wildlife Management

Academic Background B.S., Fisheries, University of Washington, 1988
M.S., Fisheries, University of Washington, 1992
Ph.D., Fisheries, University of Washington, 1995

Experience Dr. Nielsen has 20 years of experience as a fisheries biologist. He has experience in scientific research, education and environmental consulting. His work and educational experience includes conducting field surveys for fisheries and wildlife studies, test fisheries, marine mammal surveys and preparing data and reports. Dr. Nielsen prepares and contributes to technical reports including biological assessment, resource and streamside management and ecological risk assessment reports. His experience includes the following:

- Investigator for Eight Fathom Timber Sale, S.E. Alaska to determine environmental impacts of timber harvest on fisheries resources. Determined stream classifications, buffers and harvesting methods for riparian areas.
- Principal Fisheries Investigator for the Ahtanum Creek / Pine Hollow Reservoir Project. Completed preliminary review of fisheries resources in project area and the effect of various operating rules on the fishery.
- Evaluated streamside and aquatic habitat along a proposed 227-mile pipeline corridor across the Cascade Mountains. Inventoried fish present in waterways crossed by the pipeline and identified critical anadromous salmonid habitat and migration routes.
- Surveyed timber sale units in Rogue River watershed (Lawson Creek drainage) for potential impacts to aquatic resources and Riparian Reserves for the U.S. Forest Service. Prepared fisheries and aquatic resources specialist report and responses to public comments.
- Surveyed timber sale units in S.E. Alaska to determine stream classifications and presence of fish at proposed road crossings. Established necessary buffers and special harvesting requirements within riparian areas.

D) **STEVE S. LUXTON, P.E.**

Title Water Resources Specialist

Expertise Water Resources Engineering and Water Supply
Ground Water Assessment and Development
Civil Engineering and Geotechnical Engineering

Academic

Background B.Sc. (Civil Engineering) The University of Washington, 1975
M.Sc. (Hydrology) The University of Hawaii, 1988

Registration Professional Engineer, Washington #23767

Experience Mr Luxton has over 20 years experience in civil engineering and water resources work. His experience includes:

- Resident project engineer for Morse Creek Hydroelectric Project near Port Angeles, Washington
- Project team leader, Water and Sanitation for Health Project, Sultanate of Oman water resources project
- Project Engineer for the Barka Project a program for surface and groundwater management of the Batinah region in Northern Oman
- Staff Engineer for the assessment of recharge enhancement dams near Rumais, Oman
- Project engineer for water resources assessment for the Miller Peninsula Project for Mitsubishi International, a 1500 acre residential project.
- Lead engineer for Quileute Tribe's water facilities master plan resulting in a new water supply for La Push, Washington
- Project Leader for Makah Tribe Water Supply alternatives study. Assessment of 26 square mile reservation for the development of water supply and groundwater management
- Assistant Project Engineer for Athanum Creek/Pine Hollow Reservoir pre-feasibility and constructibility study.

E) **JEREMY PRATT**

Title SENIOR ASSOCIATE

Expertise Water Resources
Natural Resource Management
Water Rights and Water Allocation

Academic Background M.S., Environmental and Energy Sciences, Washington State University, 1979
B.S., Interdisciplinary Studies, The Evergreen State College, 1977

Experience Jeremy Pratt is a senior scientist with 20 years experience in natural resources management and planning, focusing on water and energy. He has directed over 200 projects for public and private clients concerned with the development, use, and management of natural resources.

His experience in water resources ranges from broad water supply program plans and integrated resource plans, to FERC hydro licensing, to river and watershed management plans and strategies for the development and protection of water rights. A few of Mr. Pratt's accomplishments include:

- Corps of Engineers for transfer of title to the New Hogan Project, for the Calaveras County Water District Board of Directors. Reviewed and defined ownership and water rights issues associated with transfer
- Principal investigator for Truckee-Carson River Basin Study for Western Water Policy Review Advisory Commission. Prepared policy review of all aspects of water resources development, management and allocation on the two rivers
- Environmental studies manager for team preparing 50-year water supply plan for Contra Costa Water District. Managing integration of fisheries, riparian/wetlands, botany, and wildlife values within the planning process
- Environmental studies manager for team preparing 30-year Basin Management Plan and EIR for the Salinas River Valley, to eliminate a seawater intrusion problem affecting the basin and to assure an adequate water supply to meet anticipated water needs within the Basin through the year 2030
- Copper Creek Dam EIS, directed intensive ecological study of wintering bald eagles as a basis for evaluating a proposed hydro project and concensus among a broad range of agencies, citizens and interest groups on appropriate management of the eagles (Seattle City Light)

Section 10. Information/technology transfer

It is the intent of D&M to utilize all pertinent data available to complete Phase 2 of the project. Data will be freely shared during public meetings and draft findings for review by interested scientific researchers and the public.

Congratulations!